REMARKS

By this paper, the Applicant has amended Claims 1, 31, 38, 39, 82, 87, 89, 93, and 93. Claim 32 has been canceled. Hence, Claims 1-25, 31, 33, 37-39, and 82-99 remain pending and are presented for further examination.

I.   Rejection of Claim 32 under 35 U.S.C. § 112

On page 3 of the Office Action, the Examiner rejected Claim 32 under 35 U.S.C. § 112 as failing to comply with the written description requirement, arguing that the phrase "adding first pattern layer node" was not described in the specification. Applicant respectfully submits that the Specification adequately defines the phrase "adding first pattern layer node."

For example, the Specification (as published) paragraph [0009] explains one embodiment as follows:

> The particular instrument values selected and their associated states define training cases, which are represented in the PNN ["probabilistic neural network"] as pattern layer nodes, one pattern layer node per training case absent compression. After construction of the PNN, additional training cases can be added in a time efficient manner as additional pattern layer nodes, to further refine the knowledge of the neural network.

Further, the neural network "contains one node in the pattern layer for each training case, wherein each training case contains a set of particular input feature values and associated output value(s)." *Specification* (as published) paragraph [0042]. "Because PNN's support fast learning, when a new training case is created to correct a prediction error, a PNN can incorporate the new training case by the trivial operation of simply adding a new pattern layer node." *Specification* (as published) paragraph [0044]. Accordingly, Applicant submits that Claim 31, which has been amended to include the subject matter of Claim 32 and which recites "a first pattern layer node to the neural network based on the first training case," does satisfy 35 U.S.C. § 112.

II.   Rejections of Claims 1-25, 31-33, 37, 39, 82-85, 87-91, and 93-96 under 35 U.S.C. § 101

On page 3 of the Office Action, the Examiner rejected Claims 1-25, 31-33, 37, 39, 82-85, 87-91, and 93-96 under 35 U.S.C. § 101 as being drawn to nonstatutory subject matter. Applicant respectfully disagrees with these rejections.

Applicant respectfully submits computer-related inventions are directed to patentable subject matter so long as the "claimed invention "transforms" an article or physical object to a

different state or thing." *See* USPTO Interim Guidelines for Examination of Patent Applications (O.G. Notices, November 22, 2005). *See, e.g., In re Lowry*, 32 F.3d 1579, 1583-84, (Fed. Cir. 1994) (claim to data structure stored on a computer readable medium that increases computer efficiency held statutory). Applicant respectfully submits that each of Claims 1-25, 31, 33, 37, 39, 82-85, 87-91, and 93-96 recite such a transformation.

For example, Claim 1 recites a method comprising "collecting a plurality of training cases in the medical instrument, wherein each training case has an input state indicative of at least a portion of a first biomedical signal of a particular patient and a corresponding output value indicative of a medical condition of the particular patient," "receiving a second biomedical signal of the particular patient in the medical instrument," "identifying a condition of the particular patient based the output of the neural network ," "applying the second biomedical signal to the generated neural network to generate an output of the neural network," and "generating an output signal based on the identified condition. In other words, Claim 1 recites a method of transforming biomedical signals of a particular patient into output "data indicative of [an] identified condition of the particular patient." Claims 89 and 99 recite systems that similarly transform biomedical signals. Similarly, Claim 31 recites a method that transforms input states and outputs "data indicative of the second output value" "indicative of a classification of a second input state." Thus, Applicant submits that independent Claims 1, 31, 89 and 99 do recite patentable subject matter. As each of Claims 2-25, 33, 37, 39, 83-85, 90, 91, 94-96 depend from one of Claims 1, 31, 89 and 99, Applicant submits that the dependent claims also are patentable for at least the same reasons.

III.   Rejections of Claims 1,2, 31-33, 37, 39, 82, 85, 87-89, 93, and 99 under 35 U.S.C. § 102

On pages 5-14 of the Office Action, the Examiner rejected Claims 1, 2, 31-33, 37, 39, 82, 85, 87-89, 93, and 99 as anticipated under 35 U.S.C. § 102 by the publication "Personal Computer System for ECG Recognition in Myocardial Infarction Diagnosing Based on an Artificial Neural Network," hereinafter referred to as "Elias." The rejections are discussed below. For the reasons set forth below, Applicant respectfully submits that Claims 1, 2, 31, 33, 37, 39, 82, 85, 87-89, 93, and 99, are patentable.

A.   Brief Description of One Embodiment

One embodiment comprises a method and system in which training data that includes biomedical signal data associated with medical conditions of a *particular patient* is used to train a neural network that recognizes signal patterns of the *particular patient* associated with particular medical events in that *particular patient*. For example, the Specification recites:

> In addition to being inefficient, applying this conventional process to the analysis of biomedical signals from a single patient is uneconomical. In order to combat the above problems, the systems and methods described herein provide an optimized neural network capable of learning, in real-time, patient states from biomedical signals, with a high degree of reliability.

Specification (as published), para. [0007] and [0008]. In particular, "in an embodiment used to detect medical events, users can customize a neural network to recognize signal patterns that are specific to *particular patient*, or patterns characteristic of entirely new classes of events such as a research project investigating EEG signal patterns of previously uncharacterized medical states." *Specification* (as publication) paragraph [0009]. Thus, one embodiment "provides an optimized neural network capable of learning, in real-time, patient states from biomedical signals, with a high degree of reliability" that can "recognize signal patterns that are specific to *particular patient*." *Specification* (as publication) paragraphs [0007]-[0009].

B.   Discussion of Rejection of Independent Claims 1, 82, 89, 93, and 99 under 35 U.S.C. § 102

The Examiner rejected Claims 1, 82, 89, 93, and 99 as being anticipated by Elias under 35 U.S.C. § 102. Claim 1 recites "generating a neural network in the medical instrument based on the plurality of training cases the *particular patient*," and "identifying a condition of the *particular patient* based the output of the neural network" (emphasis added). Elias fails to teach "generating a neural network in the medical instrument based on the plurality of training cases the *particular patient*" as recited in Claim 1. Rather, Elias discloses creating a neural network based on a database that includes ECG "measurements plus patient age and sex [to] form an neural network input vector." *Elias*, 1095 at col. 1. "Neural Network is being entrained whit [sic] the data base mentioned above and once concluded the training process the whole system will be tested in a Medical Center in order to evaluate his (sic) performance." *Elias* at 1096. Thus, Elias discloses training a model based on data from one set of patients then testing it clinically against other patients. Applicant therefore respectfully submits that Elias fails to

disclose "generating a neural network in the medical instrument based on the plurality of training cases the *particular patient,*" and "identifying a condition of the *particular patient* based the output of the neural network" (emphasis added) as recited in Claim 1.

Similarly, Claim 82 recites "generating a predictive model for identifying a subsequent medical condition of the particular patient based on an additional biomedical signal of the patient." Claim 89 recites a system comprising a processor configured to "generate a neural network based on the plurality of training cases of the particular patient." Claim 93 recites a system comprising a processing means configured to "generate a neural network based on the plurality of training cases of the particular patient." Claim 99 recites "generating a neural network in the medical instrument based on the plurality of training cases of the particular patient." Applicant submits that Elias also fails to teach or render obvious these features for at least the same reasons discussed with reference to Claim 1. Accordingly, Applicant submits that each of Claims 1, 82, 89, and 99 are patentable in view of Elias.

C.   Discussion of Rejection of Independent Claim 31

On page 7 of the Office Action, the Examiner rejected Claim 31 as being anticipated by Elias. The Examiner argued that Elias discloses "reconfiguring the neural network to correctly classify the first training case without retraining the neural network" because Elias teaches reconfiguring the neural network by adjusting the weight of each node.

However, Applicant notes that the Specification recites that "'Retraining' as used herein refers generally to any process for incorporating new training cases into a classification system that requires nontrivial computation. Within the context of a MLP (multilayer perceptron), "retraining" specifically refers to the iterative propagation process referred to above." *Specification* (as published) paragraph [0033]. "As is known to persons of ordinary skill in the art, MLP training consists of numerous iterations of propagation algorithms through all of the training cases, requiring high amounts of processing time. MLP's do not support incremental learning, meaning training on new training cases but not old, because the link weights in an MLP are updated a very small amount in each iteration." *Id.*

However, nowhere does Elias disclose any type of retraining. Rather, as noted above, Elias merely discloses that a "Neural Network is being entrained whit [sic] the data base mentioned above and once concluded the training process the whole system will be tested in a

Medical Center in order to evaluate his (sic) performance." *Elias* at 1096. In particular, Elias discloses using a MLP such as "a three layer backpropagation neural network" for which retraining would include the very "iterative propogation" that the Specification refers to as "retraining." *Elias* 1096. Accordingly, Applicant submits that Elias fails to teach or render obvious "reconfiguring the neural network to correctly classify the first training case without retraining the neural network" as recited by Claim 31. Moreover, Claim 31, as amended, recites that "reconfiguring the detection module further comprises adding a first pattern layer node to the neural network based on the first training case." Applicant respectfully submits that not only does Elias fail to disclose reconfiguring in general, it also fails to teach or suggest that "reconfiguring the detection module further comprises adding a first pattern layer node to the neural network based on the first training case" as recited by Claim 31, as amended. Accordingly, Applicant submits that Claim 31 is patentable over Elias.

As each of Claims 2, 33, 37, 39, 85, 87, and 88 depends from one of Claims 1, 31, 82, 89, 93, or 99, the Applicant submits that each of those claims is patentable for at least the same reasons discussed above with reference to Claims 1, 31, 82, 89, 93, and 99.

IV.   Rejections of Claims 3-25, 38, 83, 84, 90-92, and 94-98 under 35 U.S.C. § 103(a)

On pages 14-36 of the Office Action, the Examiner rejected Claims 3-25, 38, 83, 84, 90-92, and 94-98 under 35 U.S.C. § 103(a) as being rendered obvious by Elias in combination with other references. However, each of Claims 3-25, 38, 83, 84, 90-92, and 94-98 depends from one of Claims 1, 31, 82, 89, or 93 , the Applicant submits that each of those claims is patentable for at least the same reasons discussed above with reference to Claims 1, 31, 82, 89, and 99.

V.   Objection to Claim 86

On page 2 of the Office Action, the Examiner objected to Claim 86 as depending on rejected Claim 82. As discussed above, Applicant submits above that Claim 82 is patentable. Hence, Applicant respectfully submits that Claim 86 is allowable in its current form.

VI.   Conclusion

Applicant has endeavored to address all of the Examiner's concerns as expressed in the Office Action. Accordingly, amendments to the claims, the reasons therefor, and arguments in support of patentability of the pending claim set are presented above. Any claim amendments

which are not specifically discussed in the above remarks are made in order to improve the clarity of claim language, to correct grammatical mistakes or ambiguities, and to otherwise improve the clarity of the claims to particularly and distinctly point out the invention to those of skill in the art. Finally, Applicant submits that the claim limitations above represent only illustrative distinctions. Hence, there may be other patentable features that distinguish the claimed invention from the prior art.

Although the present communication may include alterations to the application or claims, or characterizations of claim scope or referenced art, the Applicants are not conceding in this application that previously pending claims are not patentable over the cited references. Rather, any alterations or characterizations are being made to facilitate expeditious prosecution of this application. The Applicants reserve the right to pursue at a later date any previously pending or other broader or narrower claims that capture any subject matter supported by the present disclosure, including subject matter found to be specifically disclaimed herein or by any prior prosecution. Accordingly, reviewers of this or any parent, child or related prosecution history shall not reasonably infer that the Applicants have made any disclaimers or disavowals of any subject matter supported by the present application.

In view of the foregoing, Applicant respectfully requests reconsideration and withdrawal of the outstanding rejections and, particularly, that all claims be allowed. If the Examiner finds any remaining impediment to the prompt allowance of these claims that could be clarified with a telephone conference, the Examiner is respectfully invited to call the undersigned.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

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